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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/697,185	10/30/2003	David G. Miller	US010436A	8150

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EXAMINER

MILLER, ROSE MARY

ART UNIT PAPER NUMBER

2856

DATE MAILED: 06/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

an

Office Action Summary	Application No. 10/697,185	Applicant(s) MILLER, DAVID G.	
	Examiner Rose M Miller	Art Unit 2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 10-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 10-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>10/30/2003</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Sp cification

1. The reference to parent application 09/919,250, found in the first paragraph of the specification, must be updated to reflect the current status of the parent application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1,2, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Khuri-Yakub et al. (US 6,262,946 B1)**.

With regards to claims 1 and 10, **Khuri-Yakub et al.** discloses in column 2 line 62 - column 3 line 8 an ultrasonic transducer (1) comprising a plurality of micro-machined ultrasonic transducer (MUT) elements (2) formed on a first substrate (11). The top and bottom surface of the substrate as shown in Figure 3 are considered to be the first surface and second surface of the substrate (11). **Khuri-Yakub et al.** further teaches a channel/vias (23 in Figure 10) associated with each MUT element, wherein the vias reduce cross-talk between the elements (column 4, lines 18-20). According to Applicant's disclosure in page 6, lines 6-9, cross-talk is reduced when propagation of acoustic energy waves traveling laterally through the substrate is reduced. Since the vias 23 reduce cross-talk between the MUT elements (as clearly taught by **Khuri-Yakub et al.**), it is inherent in the use of the vias to reduce the propagation of acoustic energy traveling laterally in the substrate (11) as the vias provide an acoustic impedance mismatch barrier which by design would limit the propagation of specific acoustic energy.

The invention of **Khuri-Yakub et al.** differs from the claimed invention in that the vias of **Khuri-Yakub et al.** do not extend entirely through the first substrate. It would

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have been obvious to one of ordinary skill in the art at the time the invention was made to provide for the extension of the vias through the entire substrate as one of ordinary skill in the art would recognize the advantages of further limiting the cross-talk and noise between MUT elements by extending the vias (and therefore the acoustic mismatch) through the entire substrate such that shear waves or transverse waves generated within the substrate would not bounce around the vias and produce noise in an adjacent MUT element.

The invention of **Khuri-Yakub et al.** also differs from the claimed invention in that **Khuri-Yakub et al.** fails to mention expressly that each MUT element is associated with a plurality of vias. It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide each MUT element with a plurality of vias in order to further reduce cross-talk between adjacent MUT elements, especially as most MUT element arrays are arranged such that most of the elements are adjacent to a plurality of other MUT elements and a plurality of vias would be needed to isolate each individual element from the plurality of adjacent MUT elements.

In regards to claims 2 and 11, **Khuri-Yakub et al.** teaches that the vias are etched in the substrate (see column 4, line 19).

4. Claims 3 and 12 rejected under 35 U.S.C. 103(a) as being unpatentable over **Khuri-Yakub et al.** as applied to claims 1 and 10, respectively, above, and further in view of “AN EFFICIENT ELECTRICAL ADDRESSING METHOD USING THROUGH-WAFER VIAS FOR TWO-DIMENSIONAL ULTRASONIC ARRAYS” by **Ching H. Cheng, Eugene M. Chow, Xuecheng Jin, Sanli Ergun, and Butrus T. Khuri-Yakub** (hereafter referred to as **Cheng et al.**).

Khuri-Yakub et al. teaches the claimed invention as discussed above except for specifically disclosing that the vias are etched into the first and second surfaces of the substrate.

Cheng et al. teaches a micromachined ultrasonic transducer having a wafer/substrate wherein the substrate is etched halfway from both sides/surfaces of the substrate (page 1180, column 1, 2nd full paragraph and Figures 2(a) and 3(b)). **Cheng et**

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al. further teaches that by etching the vias this way, an intended high aspect ratio can be achieved.

Cheng et al. is evidence that one of ordinary skill in the art of micromachined ultrasonic transducers with vias would recognize the benefit of etching both surfaces of the substrate.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to etch the vias of **Khuri-Yakub et al.** into both surfaces of the substrate so that an intended high aspect ratio can be achieved, as per the teachings of **Cheng et al.**

Double Patenting

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claim 1 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,669,644 B2. Although the conflicting claims are not identical, they are not patentably distinct from each other because the use of etching to produce a vias in a micromachined ultrasonic transducer is well known in the art and the removal of the tapered shape to the vias is an obvious variation as the removal of an element and its function has been found by the courts to not be a patentable invention (see *In re Karlson*, 136 USPQ 184 (CCPA

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1963), In re Wilson, 153 USPQ 740 (CCPA 1967), and Ex parte Rainu, 168 USPQ 375 (PTO Bd. of App. 1969).

7. Claim 2 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,669,644 B2 in view of **Cheng et al.** Claim 2 claims the features of Patented Claim 1 with the exception of the vias being etched from both the first and second surface of the substrate (claim 2 of the Application claims etching from the first surface only) and the removal of the tapered shape to the vias. **Cheng et al.** teaches a micromachined ultrasonic transducer having a wafer/substrate wherein the substrate is etched halfway from both sides/surfaces of the substrate (page 1180, column 1, 2nd full paragraph and Figures 2(a) ad 3(b)). **Cheng et al.** further teaches that by etching the vias this way, an intended high aspect ration can be achieved.

Cheng et al. is evidence that one of ordinary skill in the art of micromachined ultrasonic transducers with vias would recognize the benefit of etching both surfaces of the substrate.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to etch the vias into both surfaces of the substrate so that an intended high aspect ratio can be achieved, as per the teachings of **Cheng et al.**

As for the removal of the tapered shape to the vias, it would have been obvious to one of ordinary skill in the art to remove the tapered shape as the removal of an element and its function has been found by the courts to not be a patentable invention (see In re Karlson, 136 USPQ 184 (CCPA 1963), In re Wilson, 153 USPQ 740 (CCPA 1967), and Ex parte Rainu, 168 USPQ 375 (PTO Bd. of App. 1969).

8. Claim 3 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,669,644 B2. Although the conflicting claims are not identical, they are not patentably distinct from each other because the removal of the tapered shape to the vias is an obvious variation as the removal of an element and its function has been found by the courts to not be a

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patentable invention (see In re Karlson, 136 USPQ 184 (CCPA 1963), In re Wilson, 153 USPQ 740 (CCPA 1967), and Ex parte Rainu, 168 USPQ 375 (PTO Bd. of App. 1969).

9. Claim 10 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 7 of U.S. Patent No. 6,669,644 B2. Although the conflicting claims are not identical, they are not patentably distinct from each other because the use of etching to produce a vias in a micromachined ultrasonic transducer is well known in the art and the removal of the tapered shape to the vias is an obvious variation as the removal of an element and its function has been found by the courts to not be a patentable invention (see In re Karlson, 136 USPQ 184 (CCPA 1963), In re Wilson, 153 USPQ 740 (CCPA 1967), and Ex parte Rainu, 168 USPQ 375 (PTO Bd. of App. 1969).

10. Claim 11 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 7 of U.S. Patent No. 6,669,644 B2 in view of **Cheng et al.** Claim 11 claims the features of Patented Claim 7 with the exception of the vias being etched from both the first and second surface of the substrate (claim 11 of the Application claims etching from the first surface only) and the removal of the tapered shape to the vias. **Cheng et al.** teaches a micromachined ultrasonic transducer having a wafer/substrate wherein the substrate is etched halfway from both sides/surfaces of the substrate (page 1180, column 1, 2nd full paragraph and Figures 2(a) ad 3(b)). **Cheng et al.** further teaches that by etching the vias this way, an intended high aspect ration can be achieved.

Cheng et al. is evidence that one of ordinary skill in the art of micromachined ultrasonic transducers with vias would recognize the benefit of etching both surfaces of the substrate.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to etch the vias into both surfaces of the substrate so that an intended high aspect ratio can be achieved, as per the teachings of **Cheng et al.**

As for the removal of the tapered shape to the vias, it would have been obvious to one of ordinary skill in the art to remove the tapered shape as the removal of an element and its function has been found by the courts to not be a patentable invention (see In re Karlson, 136 USPQ 184 (CCPA 1963), In re Wilson, 153 USPQ 740 (CCPA 1967), and Ex parte Rainu, 168 USPQ 375 (PTO Bd. of App. 1969).

11. Claim 12 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 7 of U.S. Patent No. 6,669,644 B2. Although the conflicting claims are not identical, they are not patentably distinct from each other because the removal of the tapered shape to the vias is an obvious variation as the removal of an element and its function has been found by the courts to not be a patentable invention (see In re Karlson, 136 USPQ 184 (CCPA 1963), In re Wilson, 153 USPQ 740 (CCPA 1967), and Ex parte Rainu, 168 USPQ 375 (PTO Bd. of App. 1969).

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Miller (US 2003/0024317 A1) discloses an ultrasonic transducer wafer having a variable acoustic impedance.

Miller (US 2003/0028106 A1) discloses a micro-machined ultrasonic transducer (MUT) substrate that limits the lateral propagation of acoustic energy (this is the Pre-Grant Publication of Parent Application 09/919,250).

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rose M Miller whose telephone number is 571-272-2199. The examiner can normally be reached on Monday - Friday, 7:30 am to 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on 571-272-2208. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

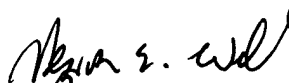
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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



RMM

20 June 2004



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